HEARING CONSERVATION PROGRAM

AUDIOMETRIC TESTING

PROTOCOLS and TECHNIQUES

28 Jan 2013

Learning Objectives

1. **Name types of audiograms and purposes**
2. **List patient characteristics that need consideration before testing**
3. **Explain the method used to establish hearing thresholds**
4. **Name factors affecting test validity and reliability**
5. **Role play pre-test activities with "patient"**

Purpose of Audiometric Testing

- Measuring individual hearing thresholds
- Determining change in hearing thresholds
- HC education and HPD fitting
- Proper referral
- First step in Fitness for Duty evaluation
- Monitor effectiveness of HCP

Hearing Measurement
by the
OHC Technician

Pure Tone Air Conduction only

Frequencies: 500 Hz – 6000 Hz

Threshold of Hearing:

softest intensity of sound that can be detected at least 50% of the time

Accurate data collection and recordkeeping

Types of Audiogram Forms

DD Form 2215

DD Form 2216

Non-HCP

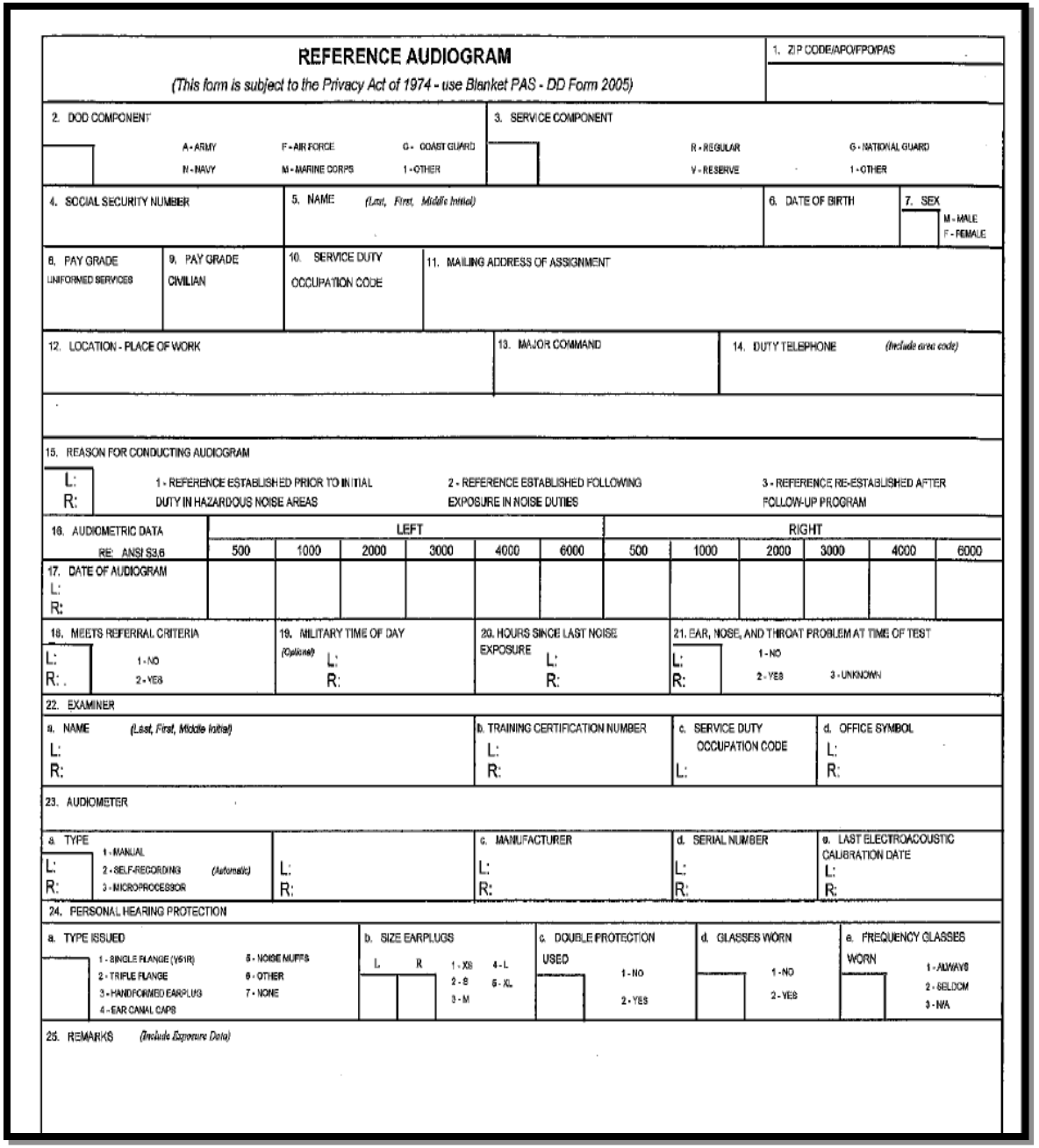
Types of Audiograms

Reference or Baseline Audiogram

DD Form 2215

- **Future tests compared to reference thresholds to measure change in hearing**
- **Required of all military personnel**
- **Required of DOD civilians enrolled in HCP**
- **Completed prior to work in hazardous noise**
- **Re-established after a confirmed STS**

Reference Audiogram 2215



REFERENCE AUDIOGRAM

(This form is subject to the Privacy Act of 1974 - use Blanket PAS - DD Form 2005)

1. ZIP CODE/APO/FPO/PAS

2. DOD COMPONENT
A - ARMY; F - AIR FORCE; G - COAST GUARD; N - NAVY; M - MARINE CORPS; 1 - OTHER

3. SERVICE COMPONENT
R - REGULAR; G - NATIONAL GUARD; V - RESERVE; 1 - OTHER

4. SOCIAL SECURITY NUMBER

5. NAME *(Last, First, Middle Initial)*

6. DATE OF BIRTH

7. SEX
M - MALE; F - FEMALE

8. PAY GRADE
UNIFORMED SERVICES

9. PAY GRADE
CIVILIAN

10. SERVICE DUTY OCCUPATION CODE

11. MAILING ADDRESS OF ASSIGNMENT

12. LOCATION - PLACE OF WORK

13. MAJOR COMMAND

14. DUTY TELEPHONE *(Include area code)*

15. REASON FOR CONDUCTING AUDIOGRAM
L:
R:
1 - REFERENCE ESTABLISHED PRIOR TO INITIAL DUTY IN HAZARDOUS NOISE AREAS
2 - REFERENCE ESTABLISHED FOLLOWING EXPOSURE IN NOISE DUTIES
3 - REFERENCE RE-ESTABLISHED AFTER FOLLOW-UP PROGRAM

16. AUDIOMETRIC DATA RE: ANSI S3.6	LEFT						RIGHT					
	500	1000	2000	3000	4000	6000	500	1000	2000	3000	4000	6000
17. DATE OF AUDIOGRAM L: R:												

18. MEETS REFERRAL CRITERIA
L:
R:
1 - NO
2 - YES

19. MILITARY TIME OF DAY *(Optional)*
L:
R:

20. HOURS SINCE LAST NOISE EXPOSURE
L:
R:

21. EAR, NOSE, AND THROAT PROBLEM AT TIME OF TEST
L:
R:
1 - NO
2 - YES
3 - UNKNOWN

22. EXAMINER

a. NAME *(Last, First, Middle Initial)*
L:
R:

b. TRAINING CERTIFICATION NUMBER
L:
R:

c. SERVICE DUTY OCCUPATION CODE
L:

d. OFFICE SYMBOL
L:
R:

23. AUDIOMETER

a. TYPE
L:
R:
1 - MANUAL
2 - SELF-RECORDING *(Automatic)*
3 - MICROPROCESSOR

b.
L:
R:

c. MANUFACTURER
L:
R:

d. SERIAL NUMBER
L:
R:

e. LAST ELECTROACOUSTIC CALIBRATION DATE
L:
R:

24. PERSONAL HEARING PROTECTION

a. TYPE ISSUED
1 - SINGLE FLANGE (V51R)
2 - TRIPLE FLANGE
3 - HANDFORMED EARPLUG
4 - EAR CANAL CAPS
5 - NOISE MUFFS
6 - OTHER
7 - NONE

b. SIZE EARPLUGS
L R
1 - XS 4 - L
2 - S 5 - XL
3 - M

c. DOUBLE PROTECTION USED
1 - NO
2 - YES

d. GLASSES WORN
1 - NO
2 - YES

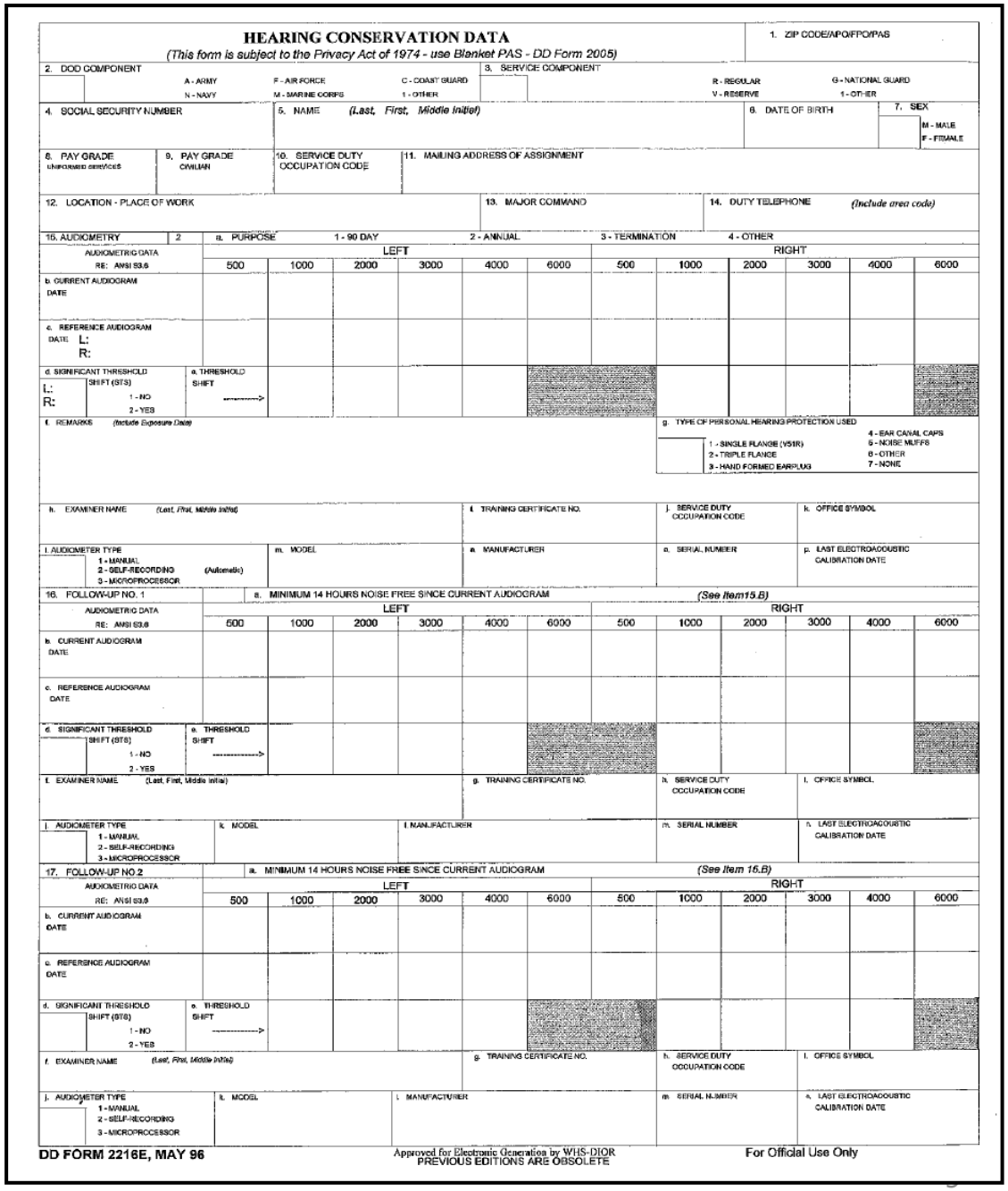
e. FREQUENCY GLASSES WORN
1 - ALWAYS
2 - SELDOM
3 - N/A

25. REMARKS *(Include Exposure Data)*

Hearing Conservation Audiogram
DD Form 2216

- Annual hearing test
- Follow-up #1 and #2 hearing tests
- Pre-Post Deployment monitoring
- Termination of active duty or enrollment in HCP
- Other

Hearing Conservation Audiogram 2216



HEARING CONSERVATION DATA

(This form is subject to the Privacy Act of 1974 - use Blanket PAS - DD Form 2005)

1. ZIP CODE/APO/FPO/PAS

2. DOD COMPONENT — A - ARMY; N - NAVY; F - AIR FORCE; M - MARINE CORPS; C - COAST GUARD; 1 - OTHER

3. SERVICE COMPONENT — R - REGULAR; V - RESERVE; G - NATIONAL GUARD; 1 - OTHER

4. SOCIAL SECURITY NUMBER

5. NAME *(Last, First, Middle Initial)*

6. DATE OF BIRTH

7. SEX — M - MALE; F - FEMALE

8. PAY GRADE UNIFORMED SERVICES

9. PAY GRADE CIVILIAN

10. SERVICE DUTY OCCUPATION CODE

11. MAILING ADDRESS OF ASSIGNMENT

12. LOCATION - PLACE OF WORK

13. MAJOR COMMAND

14. DUTY TELEPHONE *(Include area code)*

15. AUDIOMETRY — 2 — a. PURPOSE — 1 - 90 DAY; 2 - ANNUAL; 3 - TERMINATION; 4 - OTHER

AUDIOMETRIC DATA RE: ANSI S3.6	LEFT 500	LEFT 1000	LEFT 2000	LEFT 3000	LEFT 4000	LEFT 6000	RIGHT 500	RIGHT 1000	RIGHT 2000	RIGHT 3000	RIGHT 4000	RIGHT 6000
b. CURRENT AUDIOGRAM DATE												
c. REFERENCE AUDIOGRAM DATE L: R:												
d. SIGNIFICANT THRESHOLD SHIFT (STS) L: R: (1 - NO; 2 - YES)	e. THRESHOLD SHIFT ---------->											

f. REMARKS *(Include Exposure Data)*

g. TYPE OF PERSONAL HEARING PROTECTION USED — 1 - SINGLE FLANGE (V51R); 2 - TRIPLE FLANGE; 3 - HAND FORMED EARPLUG; 4 - EAR CANAL CAPS; 5 - NOISE MUFFS; 6 - OTHER; 7 - NONE

h. EXAMINER NAME *(Last, First, Middle Initial)*

i. TRAINING CERTIFICATE NO.

j. SERVICE DUTY OCCUPATION CODE

k. OFFICE SYMBOL

l. AUDIOMETER TYPE — 1 - MANUAL; 2 - SELF-RECORDING (Automatic); 3 - MICROPROCESSOR

m. MODEL

n. MANUFACTURER

o. SERIAL NUMBER

p. LAST ELECTROACOUSTIC CALIBRATION DATE

16. FOLLOW-UP NO. 1 — a. MINIMUM 14 HOURS NOISE FREE SINCE CURRENT AUDIOGRAM *(See Item15.B)*

AUDIOMETRIC DATA RE: ANSI S3.6	LEFT 500	LEFT 1000	LEFT 2000	LEFT 3000	LEFT 4000	LEFT 6000	RIGHT 500	RIGHT 1000	RIGHT 2000	RIGHT 3000	RIGHT 4000	RIGHT 6000
b. CURRENT AUDIOGRAM DATE												
c. REFERENCE AUDIOGRAM DATE												
d. SIGNIFICANT THRESHOLD SHIFT (STS) (1 - NO; 2 - YES)	e. THRESHOLD SHIFT ---------->											

f. EXAMINER NAME *(Last, First, Middle Initial)*

g. TRAINING CERTIFICATE NO.

h. SERVICE DUTY OCCUPATION CODE

i. OFFICE SYMBOL

j. AUDIOMETER TYPE — 1 - MANUAL; 2 - SELF-RECORDING; 3 - MICROPROCESSOR

k. MODEL

l. MANUFACTURER

m. SERIAL NUMBER

n. LAST ELECTROACOUSTIC CALIBRATION DATE

17. FOLLOW-UP NO.2 — a. MINIMUM 14 HOURS NOISE FREE SINCE CURRENT AUDIOGRAM *(See Item 15.B)*

AUDIOMETRIC DATA RE: ANSI S3.6	LEFT 500	LEFT 1000	LEFT 2000	LEFT 3000	LEFT 4000	LEFT 6000	RIGHT 500	RIGHT 1000	RIGHT 2000	RIGHT 3000	RIGHT 4000	RIGHT 6000
b. CURRENT AUDIOGRAM DATE												
c. REFERENCE AUDIOGRAM DATE												
d. SIGNIFICANT THRESHOLD SHIFT (STS) (1 - NO; 2 - YES)	e. THRESHOLD SHIFT ---------->											

f. EXAMINER NAME *(Last, First, Middle Initial)*

g. TRAINING CERTIFICATE NO.

h. SERVICE DUTY OCCUPATION CODE

i. OFFICE SYMBOL

j. AUDIOMETER TYPE — 1 - MANUAL; 2 - SELF-RECORDING; 3 - MICROPROCESSOR

k. MODEL

l. MANUFACTURER

m. SERIAL NUMBER

n. LAST ELECTROACOUSTIC CALIBRATION DATE

DD FORM 2216E, MAY 96 — Approved for Electronic Generation by WHS-DIOR PREVIOUS EDITIONS ARE OBSOLETE — For Official Use Only

Annual Hearing Test
DD Form 2216

- **Active military personnel enrolled in HCP**
  - ***Note: All Army and Marine Corps members are enrolled in the HCP***
- **DOD civilian personnel enrolled in HCP**
- **Must have valid DD 2215 (reference)**
  - **2216 results compared to 2215**
- **No noise-free requirement -- 14 hours**

Annual Follow-up Tests
DD Form 2216

- **Follow-up tests #1 and #2 performed after STS identified**
- **Noise-free requirement – 14 hours**
- **Both tests can be completed on same day**
- **Must be completed 1-30 days after annual DD 2216 test**

Pre/Post Deployment Hearing Test

DD Form 2216

- **Administered pre/post deployment**
  - **Army and Air Force requirement for pre and post deployment**
  - **Not required for Navy in most cases**
- **Results compared to reference DD 2215**
- **Determines HL during deployment**

Termination/Separation Hearing Test

DD Form 2216

- **Every military personnel prior to leaving active duty**
- **Civilians after removal from HCP**
- **Civilians enrolled in HCP prior to leaving civil service**

Non-Hearing Conservation Test

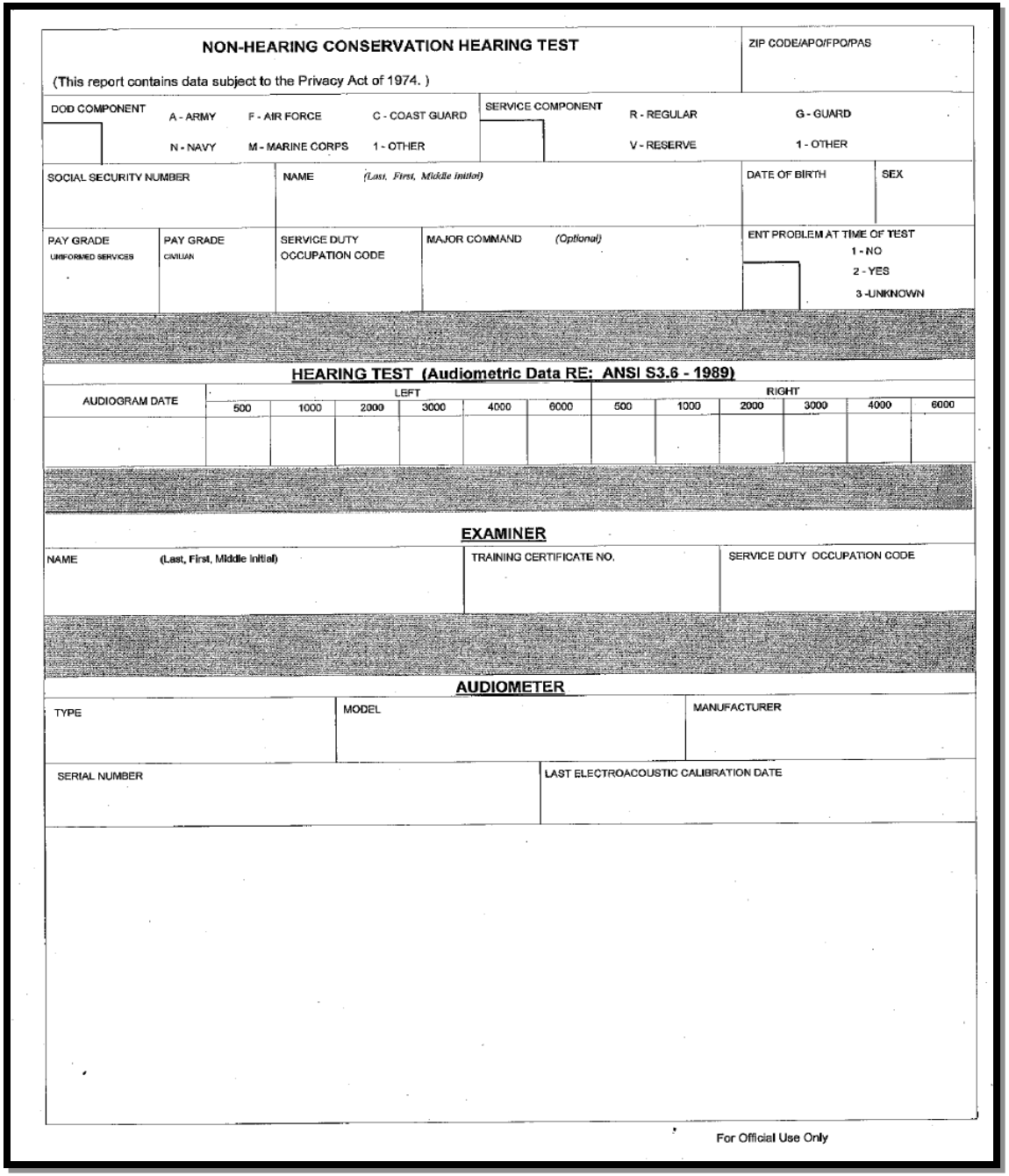
- **Personnel not routinely exposed to hazardous noise – not enrolled in HCP**

  PHA, flight physicals, dive physicals,
  Occupational Health physicals, forklift operators, commissioning, pre-hire job applicants, military reserve, “courtesy” hearing tests

- **Results not compared to reference audiogram (DD 2215)**

- **Referrals generally made to medical clinic**

Non-Hearing Conservation Form "DOEHRS-HC"



NON-HEARING CONSERVATION HEARING TEST

(This report contains data subject to the Privacy Act of 1974.)

ZIP CODE/APO/FPO/PAS

DOD COMPONENT: A - ARMY; F - AIR FORCE; C - COAST GUARD; N - NAVY; M - MARINE CORPS; 1 - OTHER

SERVICE COMPONENT: R - REGULAR; G - GUARD; V - RESERVE; 1 - OTHER

SOCIAL SECURITY NUMBER | NAME (Last, First, Middle Initial) | DATE OF BIRTH | SEX

PAY GRADE UNIFORMED SERVICES | PAY GRADE CIVILIAN | SERVICE DUTY OCCUPATION CODE | MAJOR COMMAND (Optional) | ENT PROBLEM AT TIME OF TEST (1 - NO; 2 - YES; 3 -UNKNOWN)

HEARING TEST (Audiometric Data RE: ANSI S3.6 - 1989)

AUDIOGRAM DATE	LEFT						RIGHT					
	500	1000	2000	3000	4000	6000	500	1000	2000	3000	4000	6000

EXAMINER

NAME (Last, First, Middle Initial) | TRAINING CERTIFICATE NO. | SERVICE DUTY OCCUPATION CODE

AUDIOMETER

TYPE | MODEL | MANUFACTURER

SERIAL NUMBER | LAST ELECTROACOUSTIC CALIBRATION DATE

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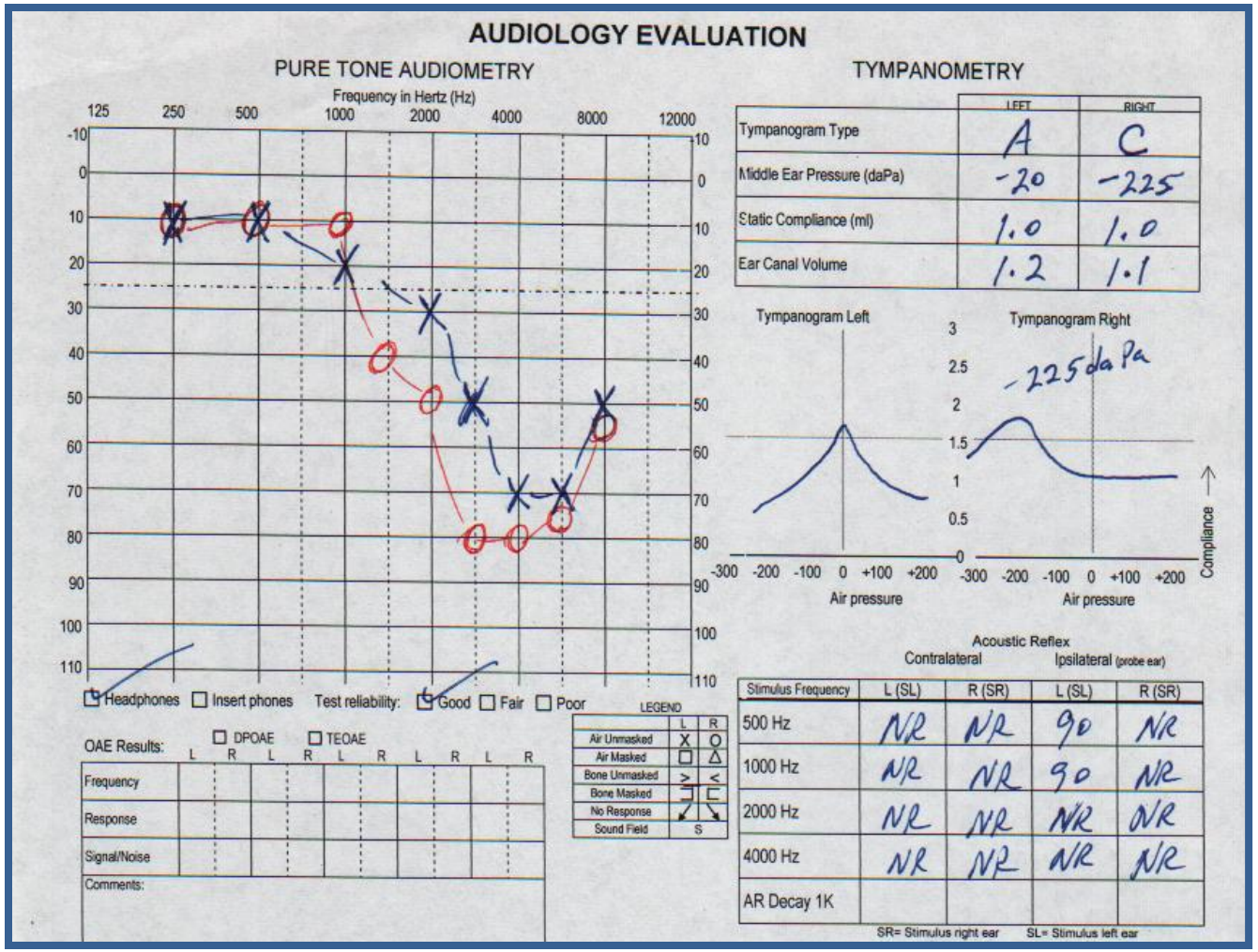
Diagnostic Audiology Evaluation

- **Administered by audiologists**
- **Includes patient history, pure tone air and bone conduction, speech recognition in quiet and noise, tympanometry, acoustic reflex, etc.**
- **Pure tone air conduction results - graph form “0” = Right ear “X” = Left ear**
- **Fitness for Duty determination**

Diagnostic Audiogram


AUDIOLOGY EVALUATION
PURE TONE AUDIOMETRY
Frequency in Hertz (Hz)
125 250 500 1000 2000 4000 8000 12000
-10 0 10 20 30 40 50 60 70 80 90 100 110
Headphones Insert phones Test reliability: Good Fair Poor
OAE Results: DPOAE TEOAE
L R L R L R L R L R
Frequency
Response
Signal/Noise
Comments:
LEGEND
L R
Air Unmasked X O
Air Masked □ △
Bone Unmasked > <
Bone Masked ⊐ ⊏
No Response ↙ ↘
Sound Field S
TYMPANOMETRY
LEFT RIGHT
Tympanogram Type A C
Middle Ear Pressure (daPa) -20 -225
Static Compliance (ml) 1.0 1.0
Ear Canal Volume 1.2 1.1
Tympanogram Left
Tympanogram Right
-225 daPa
3 2.5 2 1.5 1 0.5 0
-300 -200 -100 0 +100 +200
Air pressure
Compliance
Acoustic Reflex
Contralateral Ipsilateral (probe ear)
Stimulus Frequency L (SL) R (SR) L (SL) R (SR)
500 Hz NR NR 90 NR
1000 Hz NR NR 90 NR
2000 Hz NR NR NR NR
4000 Hz NR NR NR NR
AR Decay 1K
SR= Stimulus right ear SL= Stimulus left ear

Hearing Testing – Critical Steps

1. GETTING PATIENT READY
2. ADMINISTERING HEARING TEST
3. RECORDING TEST RESULTS

1 Getting Patient Ready

1. Obtain all demographic data required by DOEHRS-HC

2. Write test station # on demographic form

3. Best seating position

Ask questions—

a. purpose of test

b. UIC & Command

c. hearing difficulties

d. ear problems

e. exposure to hazardous noise in last 14 hrs

f. use of hearing protection and type

Special Patient Considerations

- ✓ **Glasses, hats, large earrings, gum**
- ✓ **Jackets, coats**
- ✓ **Hearing aids**
- ✓ **Personal electronic devices**

Testing Instructions

Critical Elements

- What will they hear
- What they are to do
- Earphone placement
- Length of test

(all personal electronic devices off or left outside booth)

EXAMPLE

“ I‘m looking for the softest sounds that you can hear. Even if you barely hear them, I want you to respond. Each time you hear a SERIES of beeps, immediately push and release the button only ONCE. Put the red earphone on the right ear. The test should take about 10 minutes.”

2

Administering Hearing Test

Computerized Audiometer

1. Organize patients in booth and begin test
2. Input demographic data in DOEHRS-HC software
3. Transfer (T) patient data to CCA-200
4. Retrieve (R) patient threshold data into DOEHRS-HC
5. Print (P) all data

Special Testing Situations

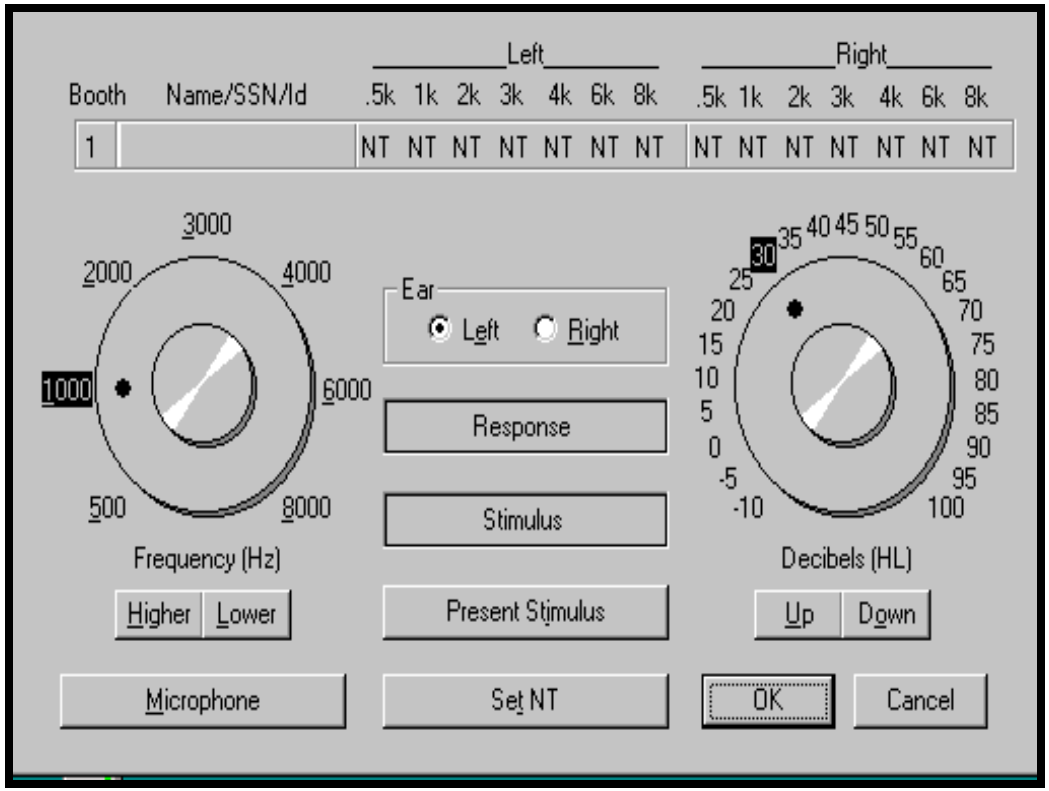
- **Asymmetrical loss (crossover)**
- **Excessive tinnitus**
- **Collapsing ear canals**
- **Inconsistent behavior**
- **Severe to profound hearing loss**
- **Claustrophobic patients**

Manual Audiometry

Computerized Audiometer

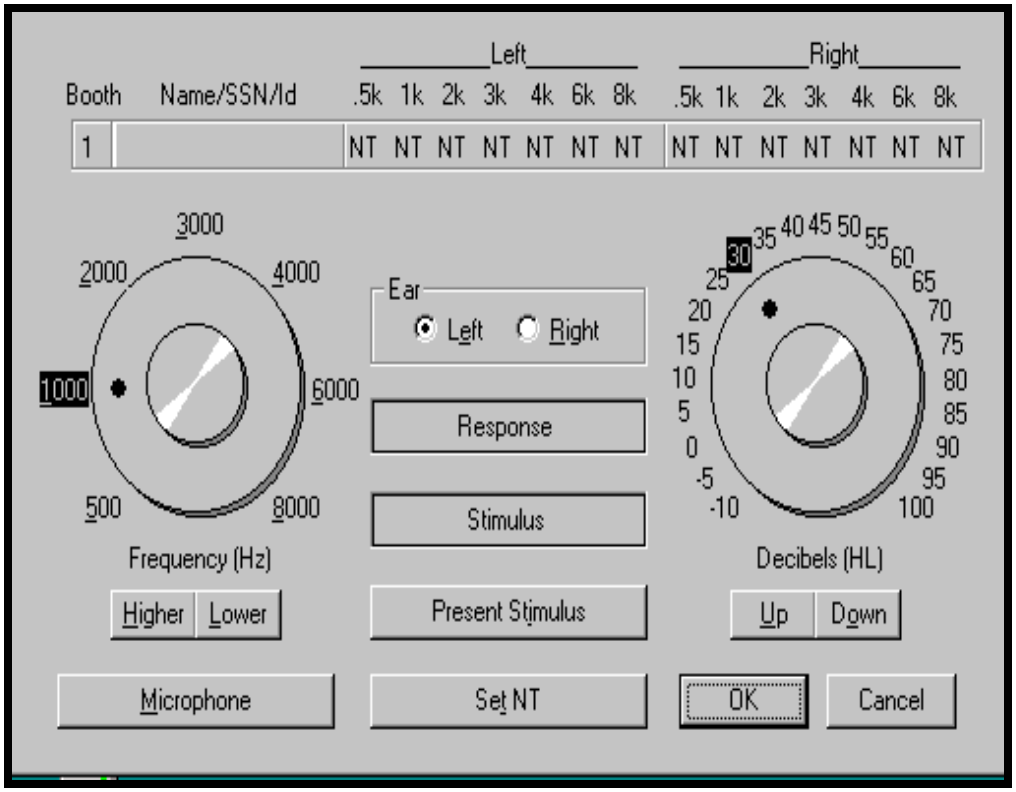
1. **Select Ear**
2. **Select Frequency**
3. **Select Decibel Level**
4. **Present Stimulus**
5. **Watch for Response**

continued …



Manual Audiometry
Computerized Audiometer #2

6. **Wait for audiometer to change dB Level**
7. **Present Stimulus**
8. **Audiometer will "lock in" threshold**
9. **Go to next frequency**
10. **Select OK to finish**



Manual Audiometry

Manual Audiometer

(Obtain more detailed instructions for this situation)

Choose test ear, test frequency, starting intensity

Present pulsed tone – vary timing presenting tones

Use Bracketing Technique:

- **If response ⇩ decrease intensity 10 dB**
- **No response ⇩ increase intensity 5 dB**

Final threshold = lowest dB level that patient responds 2 out of 3 ascending presentations

Caution in providing visual/auditory cues

Factors Affecting Test Validity

Environment

- Ambient Noise
- Ventilation
- Lighting
- Equipment & booth calibration

Procedures

- Test instructions
- Earphone placement
- Tone presentation
- Auditory/Visual cues
- OHC Technician

Patient

- Health / fatigue
- Tinnitus
- Significant HL
- Understanding of task
- Attention span
- Motivation
- Collapsing ear canals

3

Recording Results

Use the correct forms

- **DD 2215 Reference Audiogram**
- **DD 2216 Monitoring Audiogram**
- **Non-Hearing Conservation Test**

Data accuracy and validity is critical

- **Medical-legal documents**
- **HCP effectiveness and planning**

QUESTIONS ?

Roleplay Interviewing and Setting Up Patients to Test